MONTECH®

SERVOLINE Handling Components

Servo Vertical Axis

USER MANUAL
MECHANICAL PART SVA-130

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Introduction

This operating instruction describes the mechanical design, the load limits, the assembly, the maintenance and the spare parts of the Servo Vertical Axis SVA-130. It forms an integral part of the operating instruction of the servo amplifier and the operator software.

EU conformance (to EU Directive on Machines, Appendix II A)

Regulations and standards taken into account:

- EU Directive on Machines 89/392/EEC, 91/368/EEC

Manufacturer:

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Product description and application

The Servo Vertical Axis SVA-130 is an electrically operated, position-controlled linear unit which serves as a vertical unit for the construction of portal loaders. Depending on the size of the unit, movements along the z-axis of up to 200, 400 or 600 mm are possible. Servo horizontal axes SHA, two-dimensional servo portals FP or Linear Units (LEP) can be used for performing horizontal movements. Compact slides (KSD), Rotary Drives DAP and Grippers GPS, GPP, etc. or any tool-bearing units can be attached as long as the load limits of the Servo Vertical Axis SVA-130 are complied with.

Servo Vertical Axes SVA-130 which have been retrofitted to portal loaders are suitable for many and varied tasks, such as loading machines, small parts assembly, transposition, packaging, palletizing and parts supply from magazines containing workpieces.

Dangers

The use of servo vertical axes SVA-130 in equipment is permissible only if they are protected by **movable, separating protective devices according to EN 292-2 Section 4.2.2.3**.
Observe the operating conditions and safety notes described in the operating instruction.
It is absolutely essential that you keep within the stated load limits.

Important!

During operation, the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature). During maintenance work on the servo vertical axis, ensure that the power to the drive is switched off. The servo amplifier must be disconnected from the supply voltage. Switch off the main switch or mains contactor.

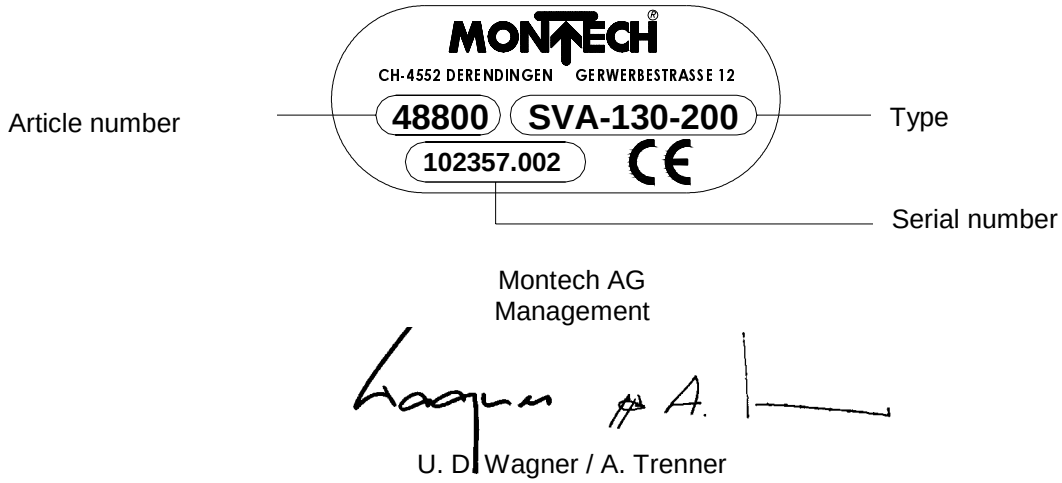
- **Switch off the enable signal**
- **Switch off the mains power (L1, L2, L3)**
- **Ensure that no unauthorized switching-on of the supply voltage can occur.**

Failure to observe these safety measures may result in death or severe injuries or material damage.

Additional information

The present User Manual is intended to permit proper and safe use of the servo vertical axis SVA-130. If any information is missing for your particular application, please contact the manufacturer.
When reordering user manuals, it is essential to quote the serial number (see Fig. 1). Single copies are provided free of charge.

Fig.1



Validity of the User Manual

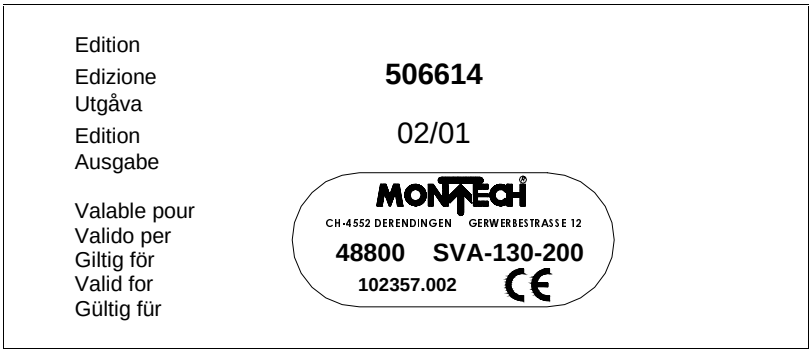
Our products are continually updated to reflect the latest state of the art and practical experience.

In line with product developments, the user manuals are continually updated.

To avoid confusion, check that the present User Manual is valid for the servo vertical axis SVA-130 to be commissioned.

Every User Manual has an edition number, e.g. 506614 (Fig. 2). The label affixed to the title page shows the product serial number for which the edition number on the User Manual is valid.

Fig. 2



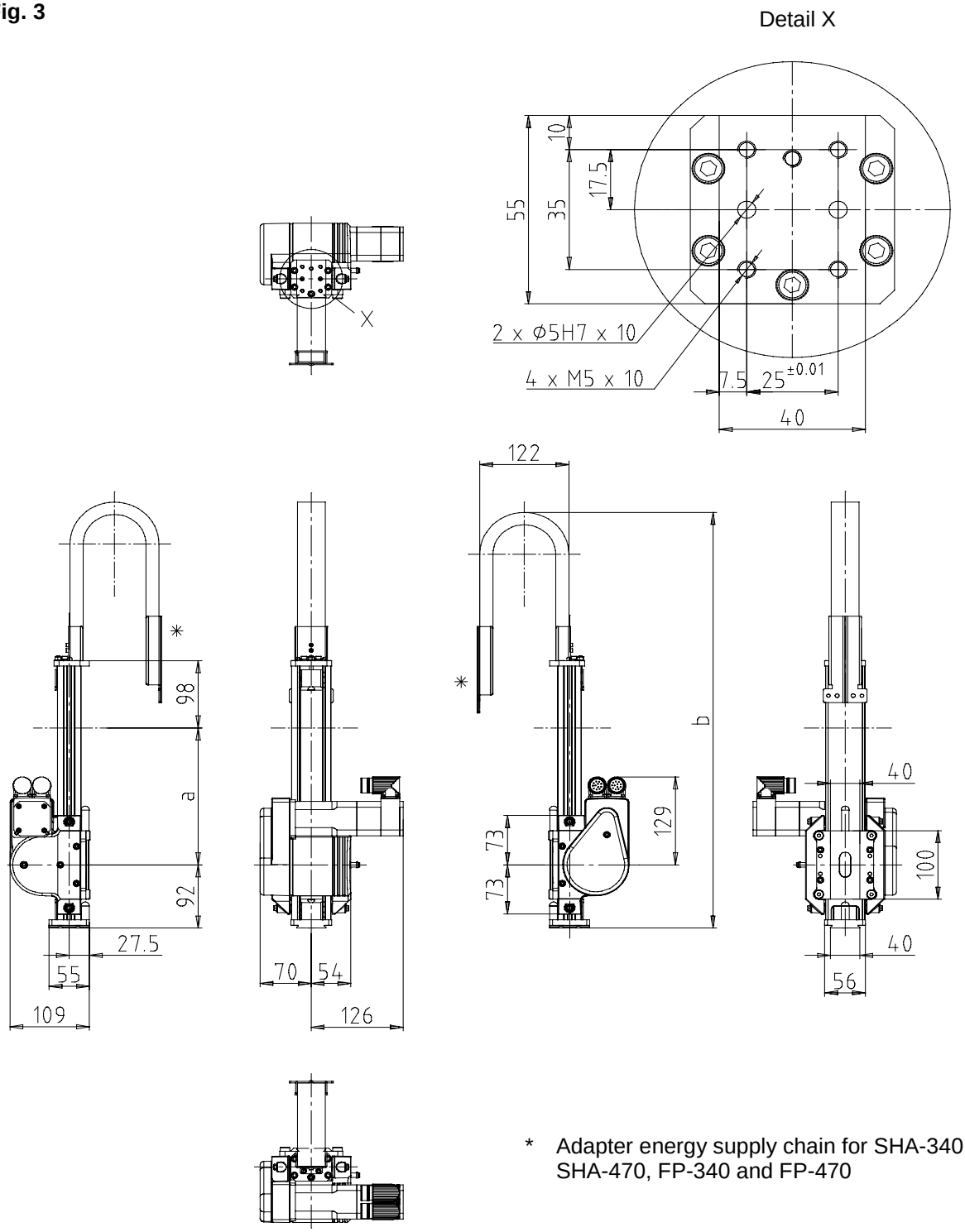
Servo vertical axis SVA-130

			SVA-130-200	SVA-130-400	SVA-130-600
Max. stroke		[mm]	200	400	600
Max. permissible mounting mass		[kg]	5	5	5
Max. speed		[mm/s]	1300	1300	1300
Max. acceleration	1)	[m/s^2]	5	5	5
Own weight		[kg]	3.6	3.85	4.1
Drive			highly dynamic synchronous servo motor with locking brake		
Rated motor power		[W]	130		
Enclosure protection for servo motor			IP64		
Transmitter system			Resolver		
Repeatability	2)	[mm]	+/- 0.02		
Reference position proximity switch			integrated inductive proximity switch PNP		
Sound level		[dBA]	<65		
Max. operating temperature of motor	3)	[°C]	65		
Ambient conditions: Temperature		[°C]	10 - 50		
Rel. humidity			5% ... 85% non-condensing		
Air purity			normal workshop atmosphere		
Warranty period			2 years from date of delivery		
Installation position			vertical		
Material			aluminium, steel, plastic		

1) At max. permissible mounting mass
2) At constant motor temperature.
Measured at max. load, max. speed and 100 consecutive strokes
3) At 20°C ambient temperature

Dimensioned drawing

Fig. 3

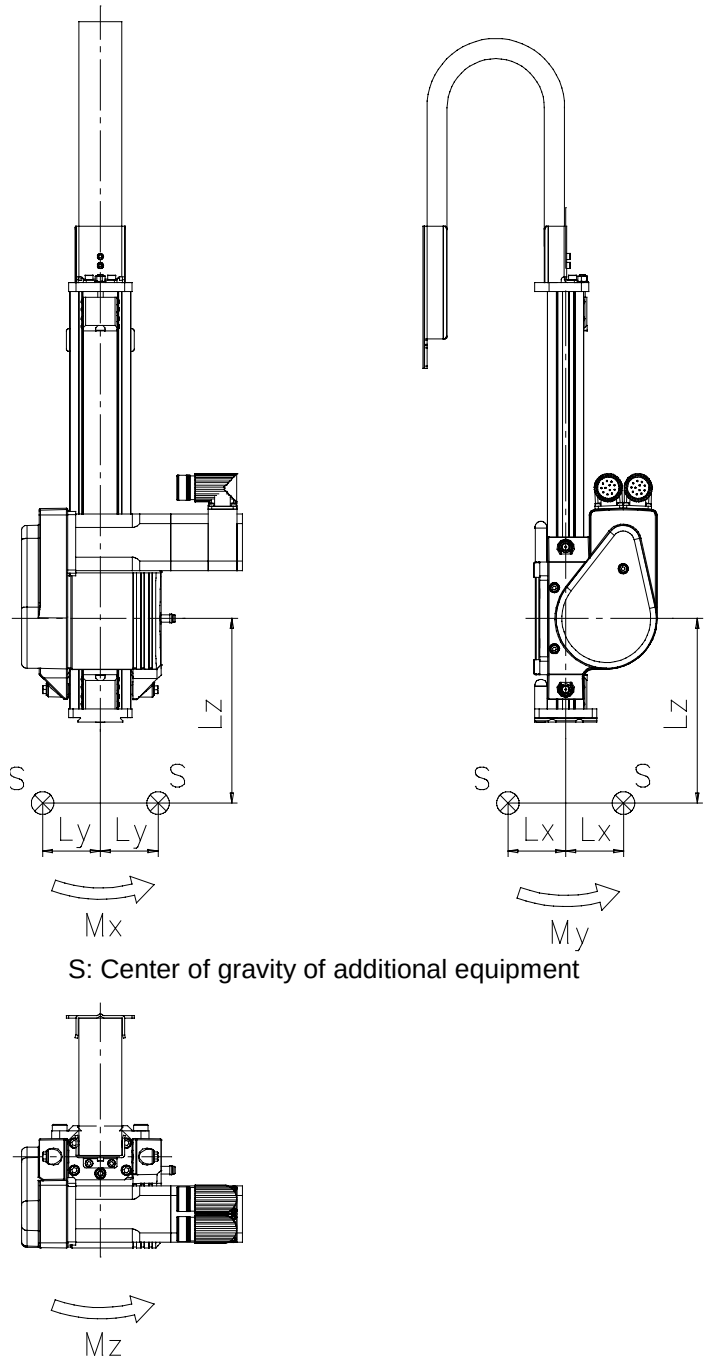


* Adapter energy supply chain for SHA-340, SHA-470, FP-340 and FP-470

	a	b
SVA-130-200	200	600
SVA-130-400	400	700
SVA-130-600	600	900

Load calculations for SVA

Fig. 4



S: Center of gravity of additional equipment

a) Existing moments

$$M_X = 0.001 \cdot m \cdot a_Z \cdot L_Y + 0.01 \cdot m \cdot L_Y$$
$$M_Y = 0.001 \cdot m \cdot a_Z \cdot L_X + 0.01 \cdot m \cdot L_X$$

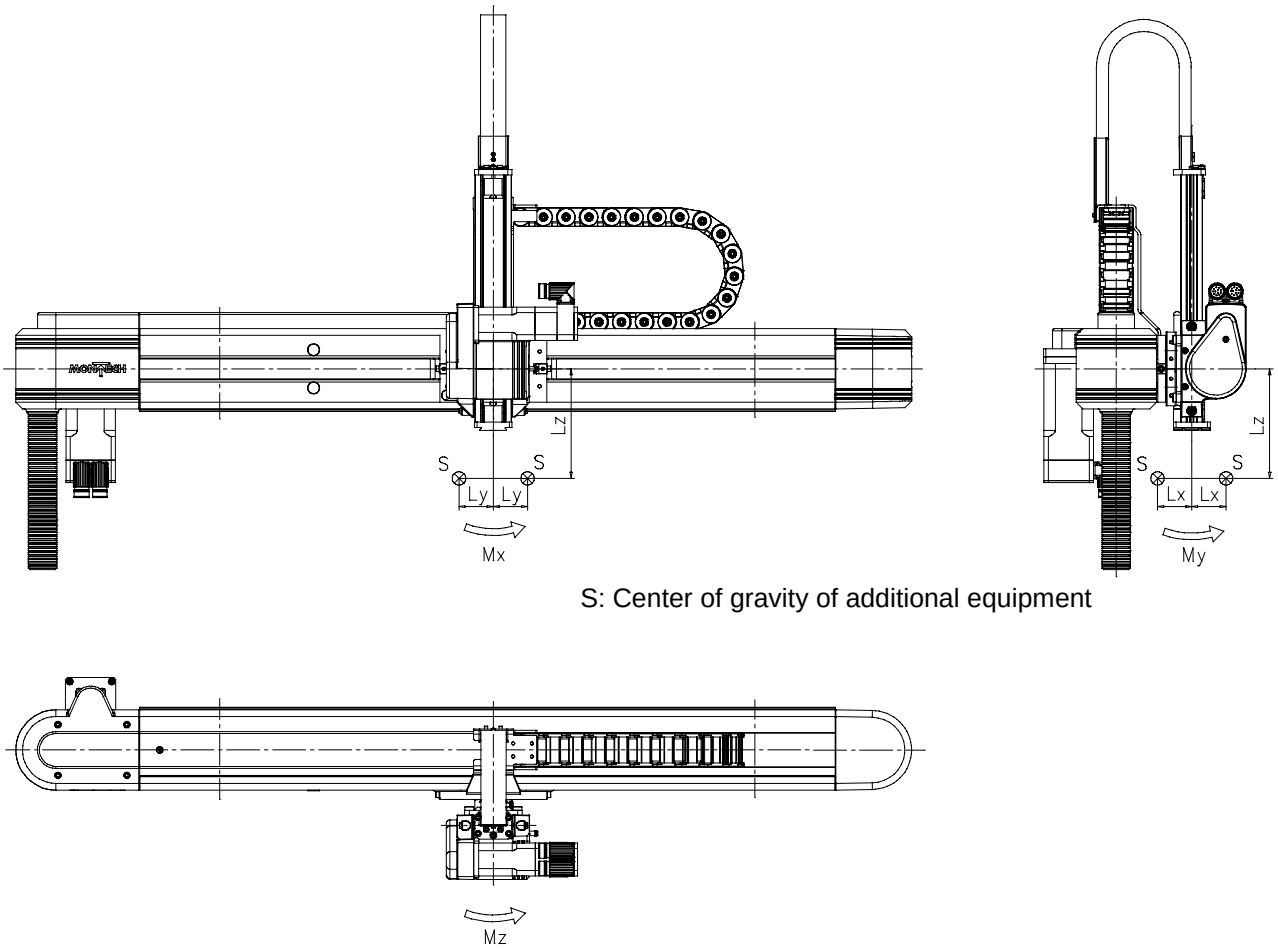
b) Load

$$B = \frac{M_X}{27} + \frac{M_Y}{31} \leq 1$$

B:	Load factor: **Must not exceed the value 1!**
M_X, M_Y	Existing moments [Nm]
m	Mounting mass [kg]
L_X, L_Y	Distance of centre of gravity of moving mass [mm]
a_Z	Acceleration of the z-axis [m/s^2]

Load calculations for SVA-130 with SHA

Fig. 5



S: Center of gravity of additional equipment

a) Existing moments

$$M_X = 0.001 \cdot m \cdot (a_Z \cdot L_Y + a_Y \cdot L_Z) + 0.01 \cdot m \cdot L_Y$$
$$M_Y = 0.001 \cdot m \cdot a_Z \cdot L_X + 0.01 \cdot m \cdot L_X$$
$$M_Z = 0.001 \cdot m \cdot a_Y \cdot L_X$$

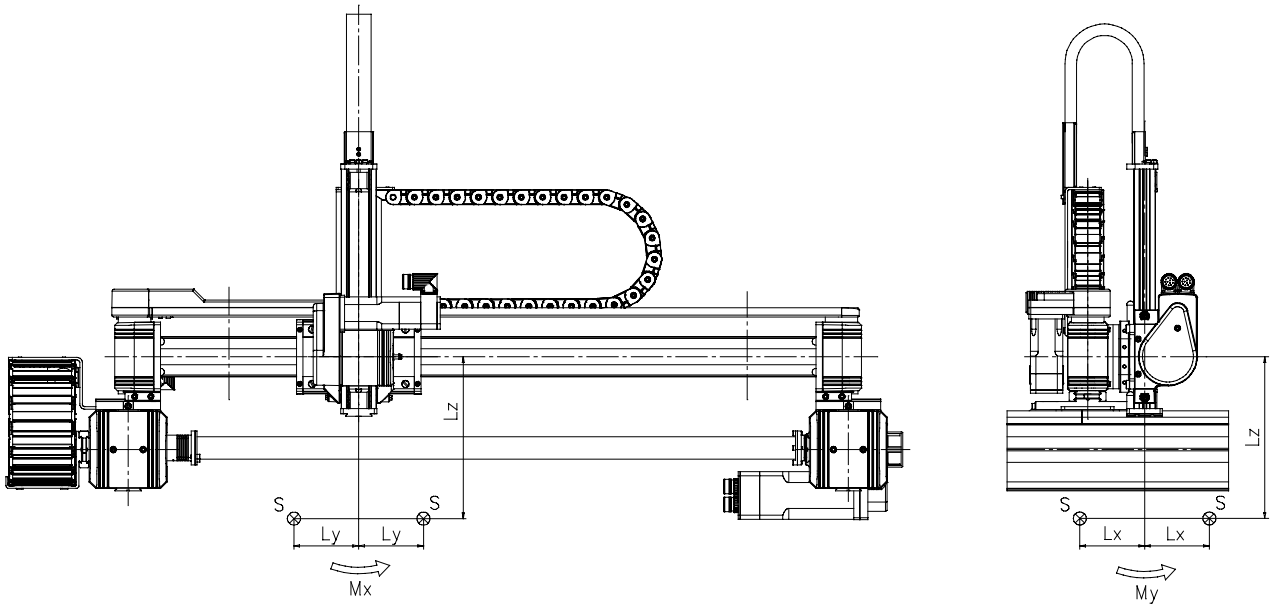
b) Existing moments

$$B = \frac{M_X}{27} + \frac{M_Y}{31} + \frac{M_Z}{26} \leq 1$$

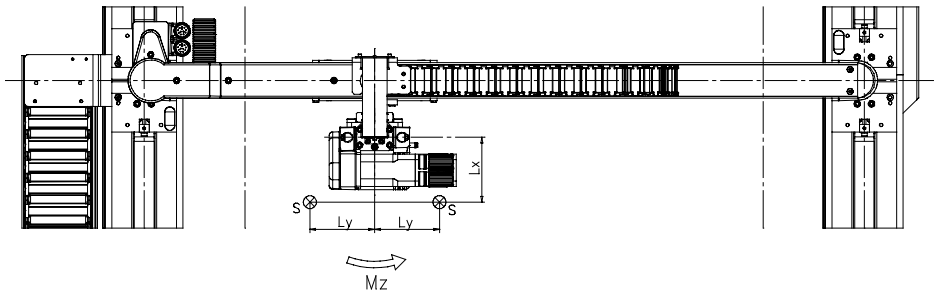
B:	Load factor: **Must not exceed the value 1!**
M_X, M_Y, M_Z	Existing moments [Nm]
m	Mounting mass [kg]
L_X, L_Y, L_Z	Distance of centre of gravity of the moving mass [mm]
a_Y	Acceleration of the y-axis [m/s^2]
a_Z	Acceleration of the z-axis [m/s^2]

Load calculations for SVA-130 with FP

Fig. 6



S: Center of gravity of additional equipment



a) Existing moments

$$M_X = 0.001 \cdot m \cdot (a_Z \cdot L_Y + a_Y \cdot L_Z) + 0.01 \cdot m \cdot L_Y$$
$$M_Y = 0.001 \cdot m \cdot (a_Z \cdot L_X + a_X \cdot L_Z) + 0.01 \cdot m \cdot L_X$$
$$M_Z = 0.001 \cdot m \cdot (a_Y \cdot L_X + a_X \cdot L_Y)$$

b) Existing moments

$$B = \frac{M_X}{27} + \frac{M_Y}{31} + \frac{M_Z}{26} \leq 1$$

B:	Load factor: **Must not exceed the value 1!**
M_X, M_Y, M_Z	Existing moments [Nm]
m	Mounting mass [kg]
L_X, L_Y, L_Z	Distance of centre of gravity of the moving mass [mm]
a_X	Acceleration of the x-axis [m/s^2]
a_Y	Acceleration of the y-axis [m/s^2]
a_Z	Acceleration of the z-axis [m/s^2]

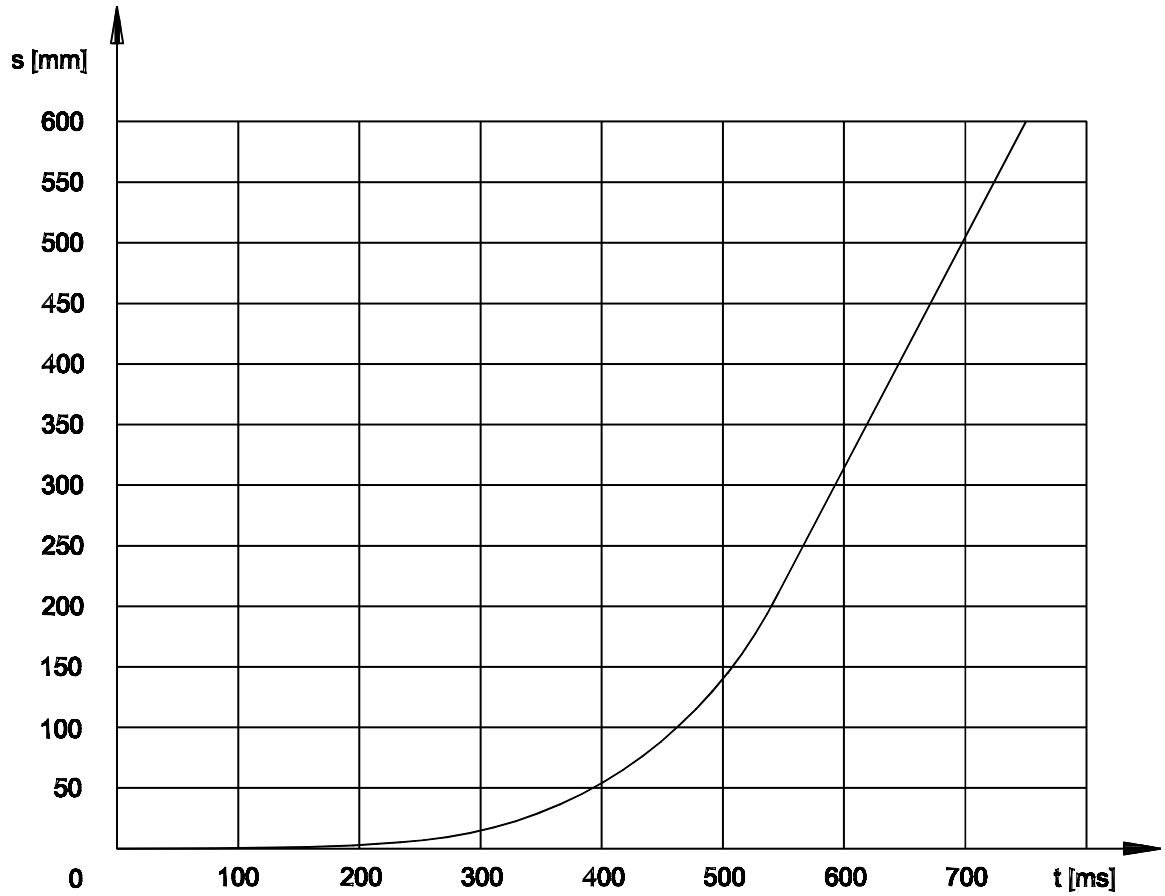
Traversing times

The traversing times were determined with an SVA-130-600 under the following conditions:

- Load: 5 kg
- Acceleration or deceleration: 5 m/s^2
- Start of measurement: Start signal at input X11B/2 (Fstart_No.x)
- End of measurement: InPosition signal at output X11B/3 (InPos)
- InPositions window: 0.05 mm
- Low-vibration Quick-Set base

A stable, low-vibration construction is extremely important for achieving the times according to the diagram.

Fig. 7



Mechanical design

Designing the installation

When designing the installation, the following points must be taken into account:

- The servo vertical axis SVA-130 must only be operated behind a protective device according to EN 292-2 Section 4.2.2.3.
- Ensure unrestricted ventilation of the motor and keep within the permitted ambient temperatures.
- Realize a low-vibration Quick-Set construction.

Installation position and assembly

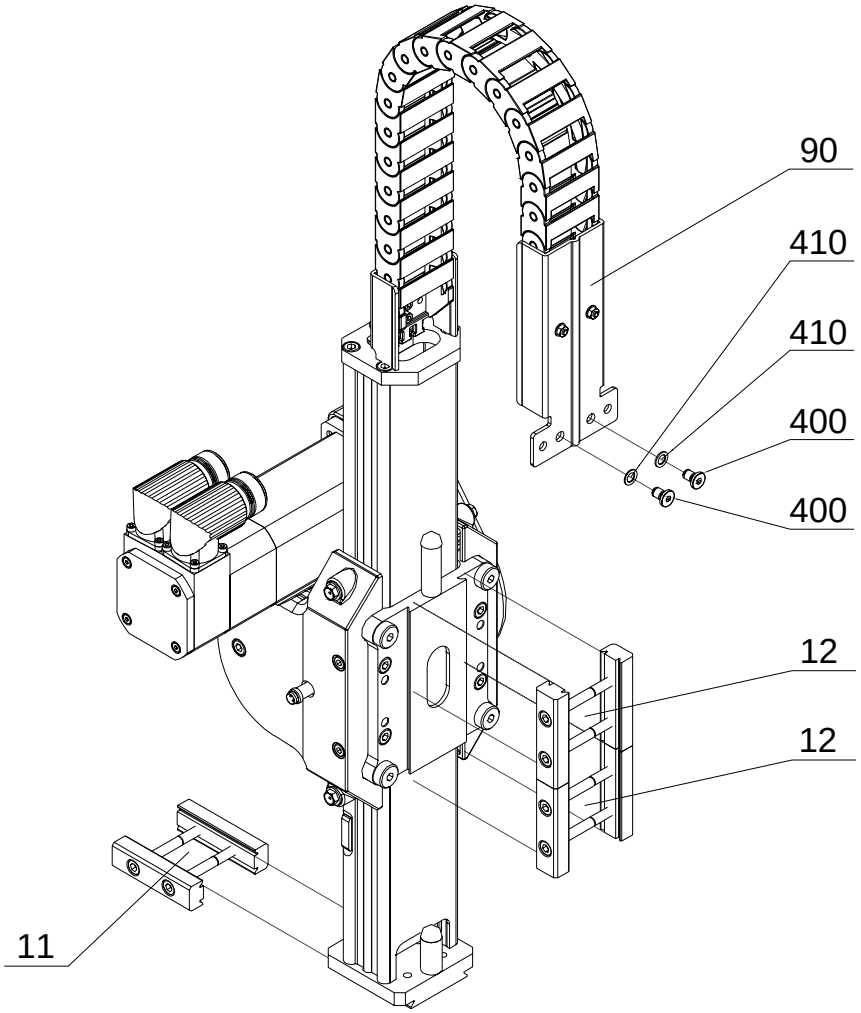
Tool required	Dimension	Use for:
Hexagon socket wrench	3 mm	Item 400
	4 mm	Items 11; 12

The servo vertical axis SVA-130 is installed vertically. Attachment is via the dovetail of the adapter plate by means of two Quick-Set clamping elements SLL-55 (12).

The additional units are installed via the dovetail of the slide adapter plate with the aid of a clamping element SLL-55 (11) or SLR-15. Alternatively, the fixing holes can be used (see dimensioned drawing, Fig. 3).

The adapter of the energy conducting carrier (90) can be attached with two screws (400) and two ribbed washers (410) on the hose holder of an SHA-340, SHA-470, FP-340 or FP-470. The straight pins for centring the adapter are mounted on the horizontal axes or two-dimensional portal in the standard version.

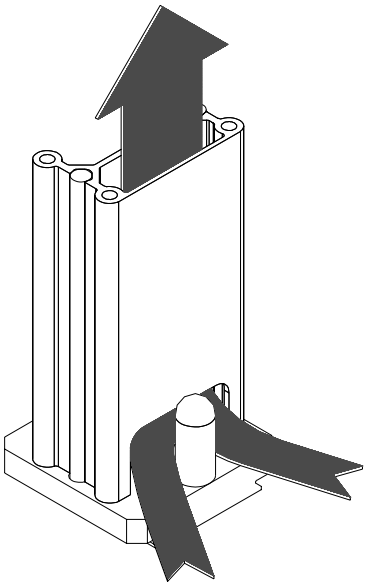
Fig. 8



Laying the supply lines of the additional units

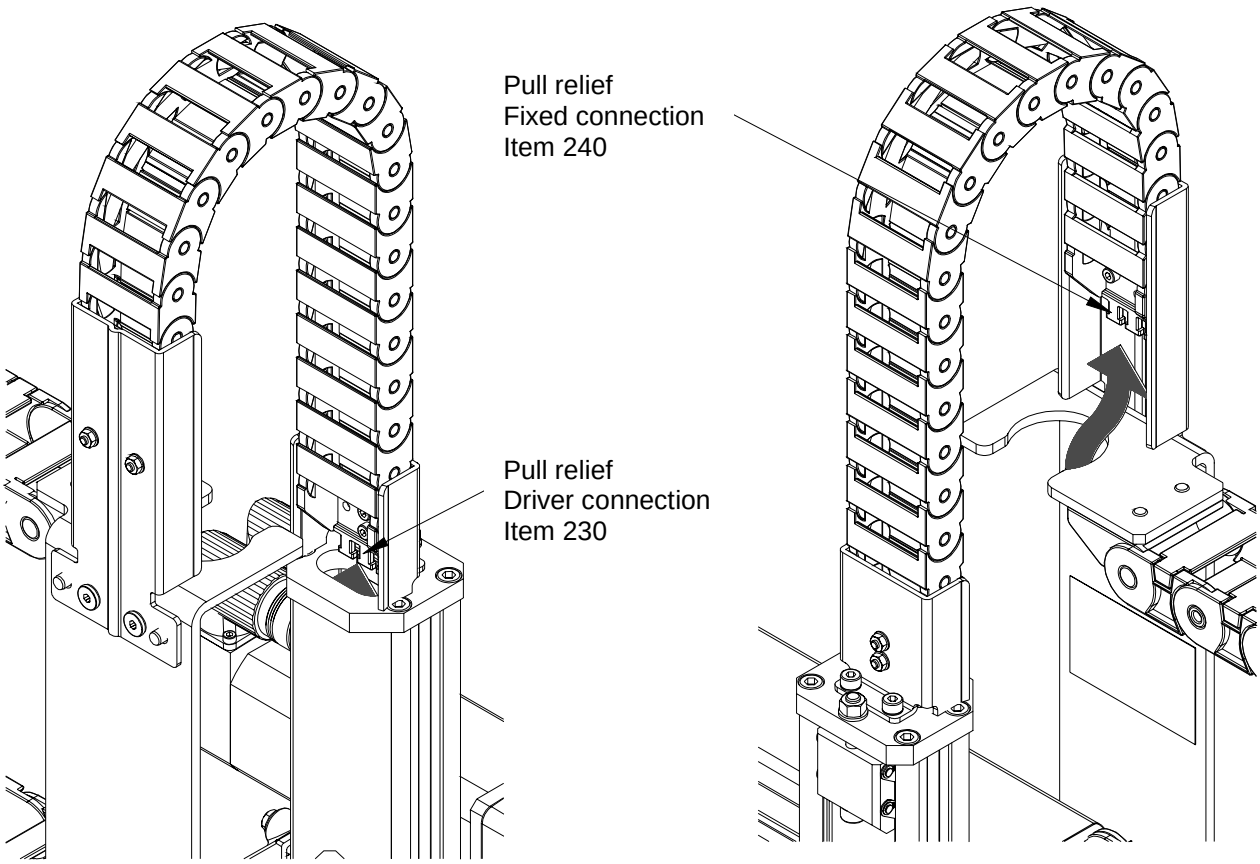
The supply lines can be led through the lifting arm profile.

Fig. 9



The driver connection and the fixed connection of the energy conducting carrier have pull reliefs. The hoses and cables can be attached to the pull reliefs by means of cable ties.

Fig. 10

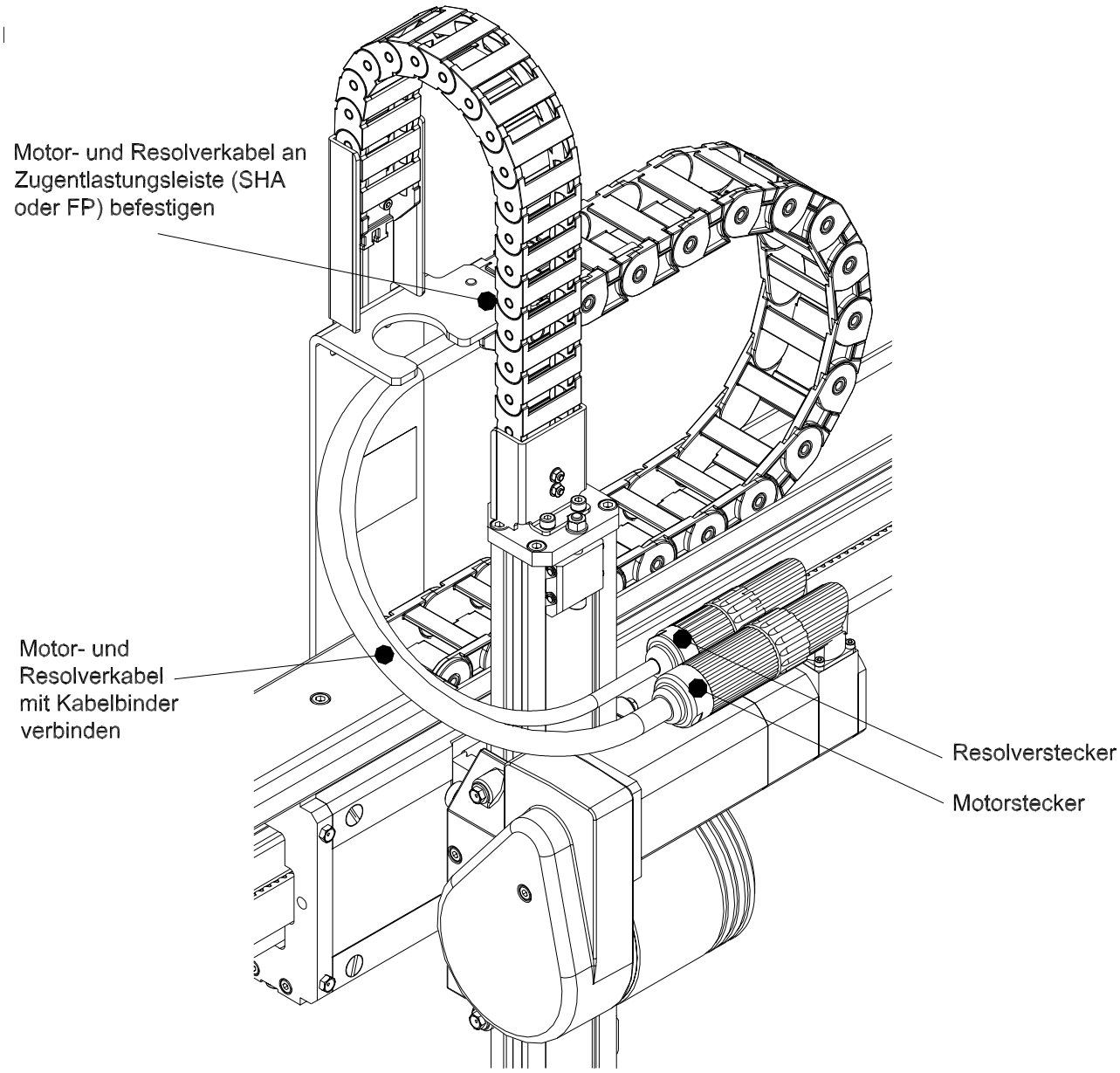


Connecting the motor cable and the resolver cable

- **The servo amplifier must be disconnected from the supply voltage. Switch off the main switch or mains contactor.**
- **Ensure that no unauthorized switching-on of the supply voltage can occur.**
- **During operation, the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).**
- **Failure to observe these safety measures may result in death or severe personal injuries or material damage.**

The supplied motor cables and resolver cables are 5 m in length. Longer cables are available as options. The cables are ready-made with coded concentric plugs on the motor side.

The motor cables and resolver cables can be laid according to Figure 11. The cables are attached to the pull relief of the horizontal axis or of the two-dimensional portal.


Motor- und Resolverkabel an Zugentlastungsleiste (SHA oder FP) befestigen
Motor- und Resolverkabel mit Kabelbinder verbinden
Resolverstecker
Motorstecker

Connecting the inductive proximity switch

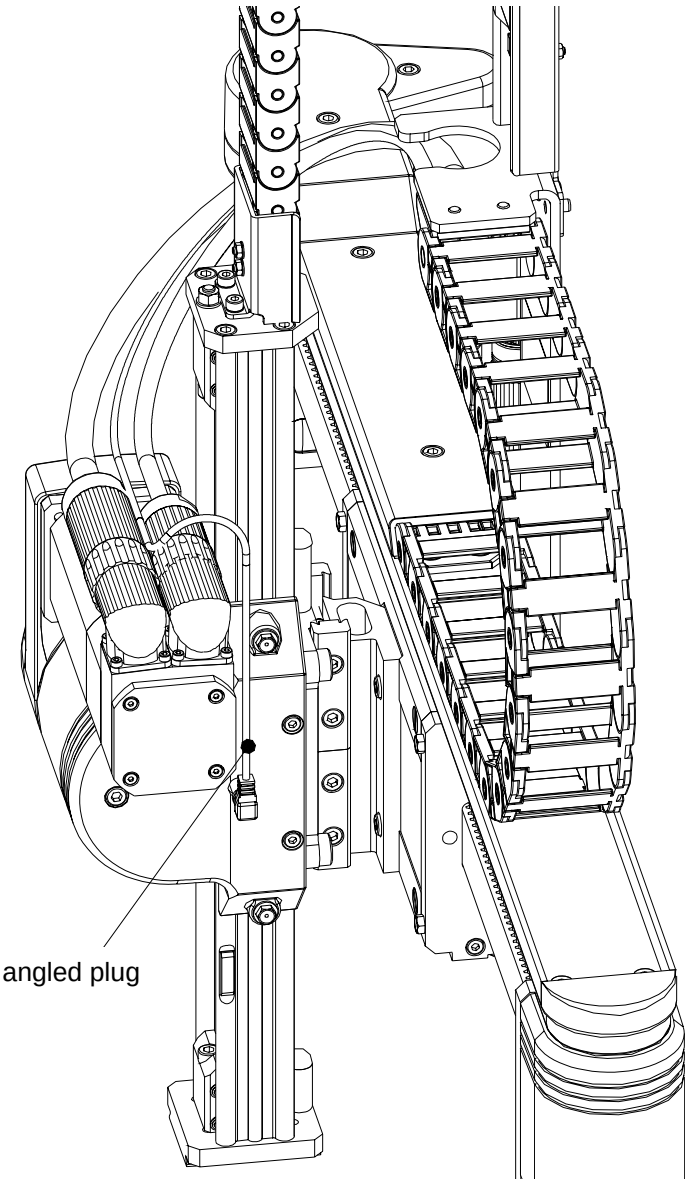
- **The servo amplifier must be disconnected from the supply voltage. Switch off the main switch or mains contactor.**
- **Ensure that no unauthorized switching-on of the supply voltage can occur.**
- **During operation, the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).**
- **Failure to observe these safety measures may result in death or severe personal injuries or material damage.**

The length of the cable of the proximity switch supplied is 5 m. The cable is ready-made on the proximity switch side and is equipped with an angled plug.

The proximity switch cable can be laid according to Figure 12. The proximity switch cable can be attached with cable ties to the motor cable and resolver cable or to the pull relief of the horizontal axis or of the two-dimensional portal.

Ensure that the proximity switch cable cannot be damaged by vertical traversing of the axis!

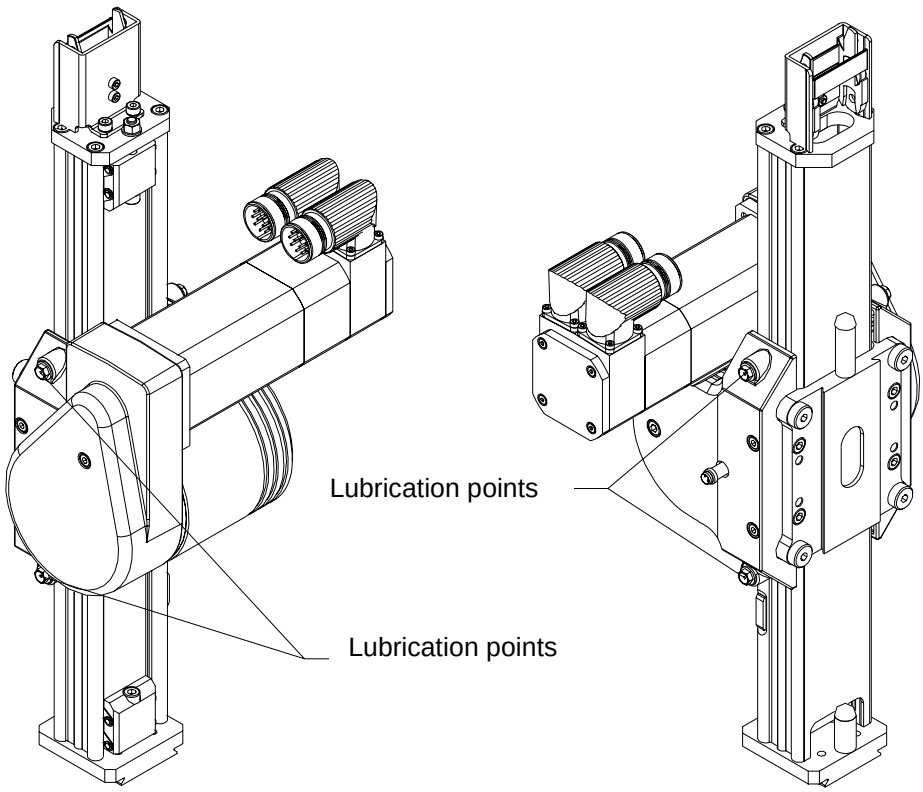
Fig. 12



Lubrication

- **The servo amplifier must be disconnected from the supply voltage. Switch off the main switch or mains contactor.**
- **Ensure that no unauthorized switching-on of the supply voltage can occur.**
- **During operation, the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).**
- **Failure to observe these safety measures may result in death or severe personal injuries or material damage.**

Fig. 13



Use only **Klüber "Paraliq P460" Oil** as lubricant.

- Lubrication interval: 800 operating hours
- Lubrication points: 4 lubricating nipples (Fig. 13)

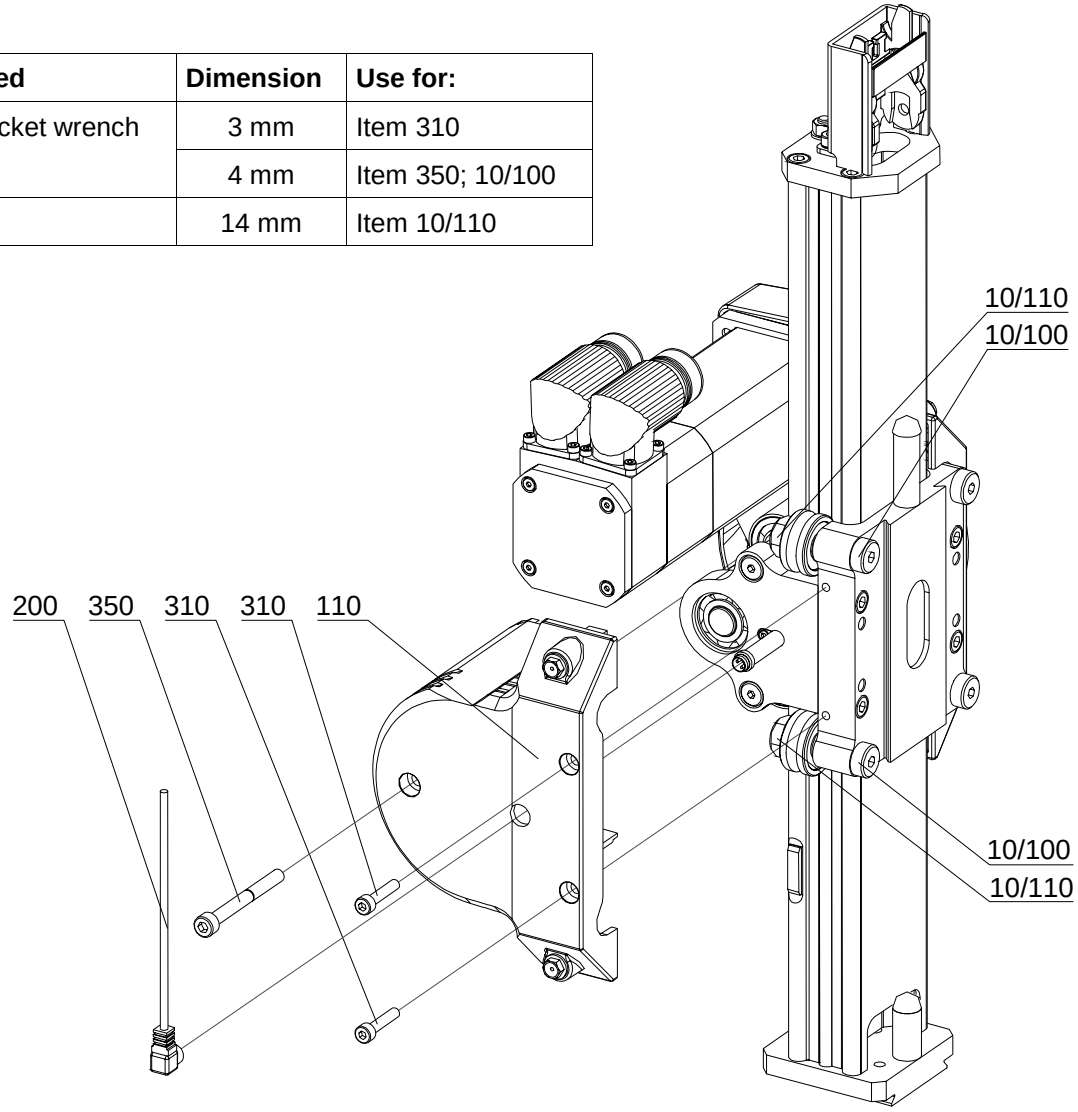
Setting the slide play

- **The servo amplifier must be disconnected from the supply voltage. Switch off the main switch or mains contactor.**
- **Ensure that no unauthorized switching-on of the supply voltage can occur.**
- **During operation, the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).**
- **Failure to observe these safety measures may result in death or severe personal injuries or material damage.**

- Remove plug (200).
- Remove covers (110). Caution! Ensure that the felt wick in the cover (110) of the lubrication unit does not fall out.
- Slacken nut (10/110). Hold eccentric screw (10/100) with socket screw wrench.
- Adjust the rollers to eliminate play by turning the eccentric screw (10/100) clockwise (without pretension).
- Tighten nut (10/110) while holding the eccentric screw (10/100) with the socket screw wrench so that the set slide play does not change.
- Mount covers (110). Caution! The two lubricating felts in the cover must touch the shaft.
- Mount plug (200; Fig. 15).

Tool required	Dimension	Use for:
Hexagon socket wrench	3 mm	Item 310
	4 mm	Item 350; 10/100
Spanner	14 mm	Item 10/110

Fig. 14



Changing and setting the inductive proximity switch

- **The servo amplifier must be disconnected from the supply voltage. Switch off the main switch or mains contactor.**
- **Ensure that no unauthorized switching-on of the supply voltage can occur.**
- **During operation, the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).**
- **Failure to observe these safety measures may result in death or severe personal injuries or material damage.**

Tool required	**Dimension**	**Use for:**
Leaf gauge	0.5 mm	Distance between item 140 and item 10/160
Hexagon socket wrench	1.5 mm	Item 10/140
	3 mm	Item 310
	4 mm	Item 350

- Remove plug (200).
- Remove covers (110). Caution! Ensure that the felt wick in the cover (110) of the lubrication unit does not fall out.
- Slacken screw (10/140) and remove proximity switch (10/160).

Fig. 15

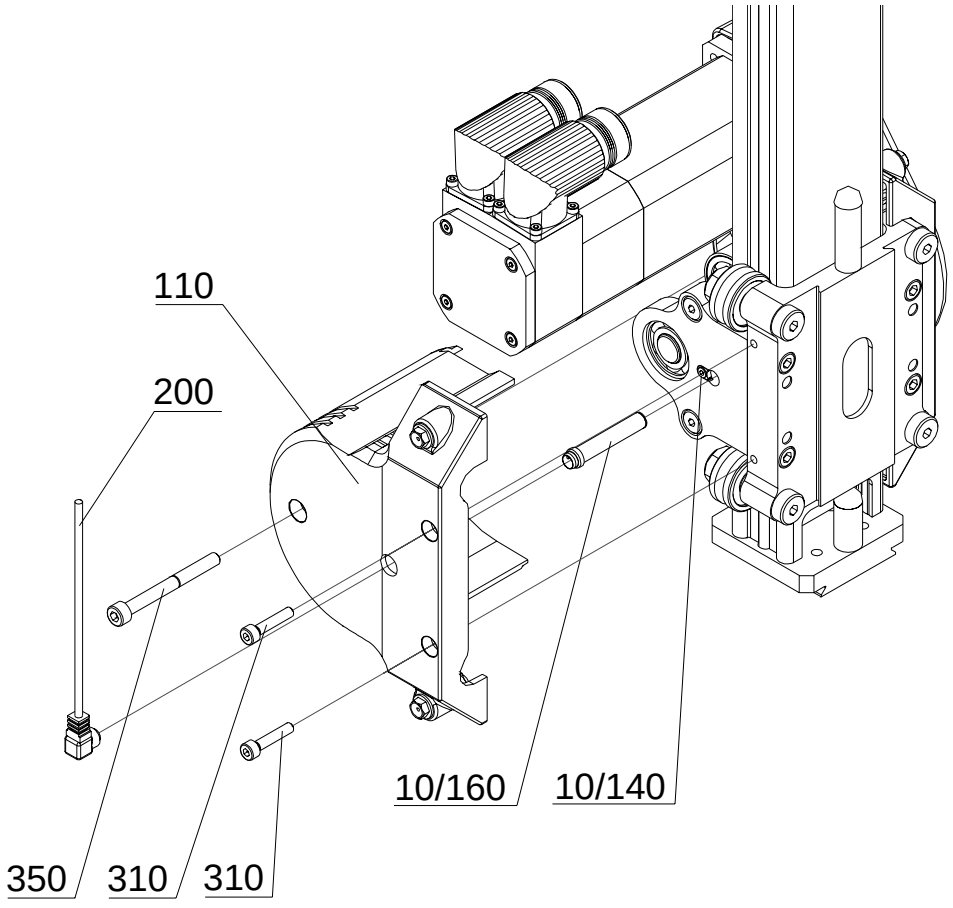
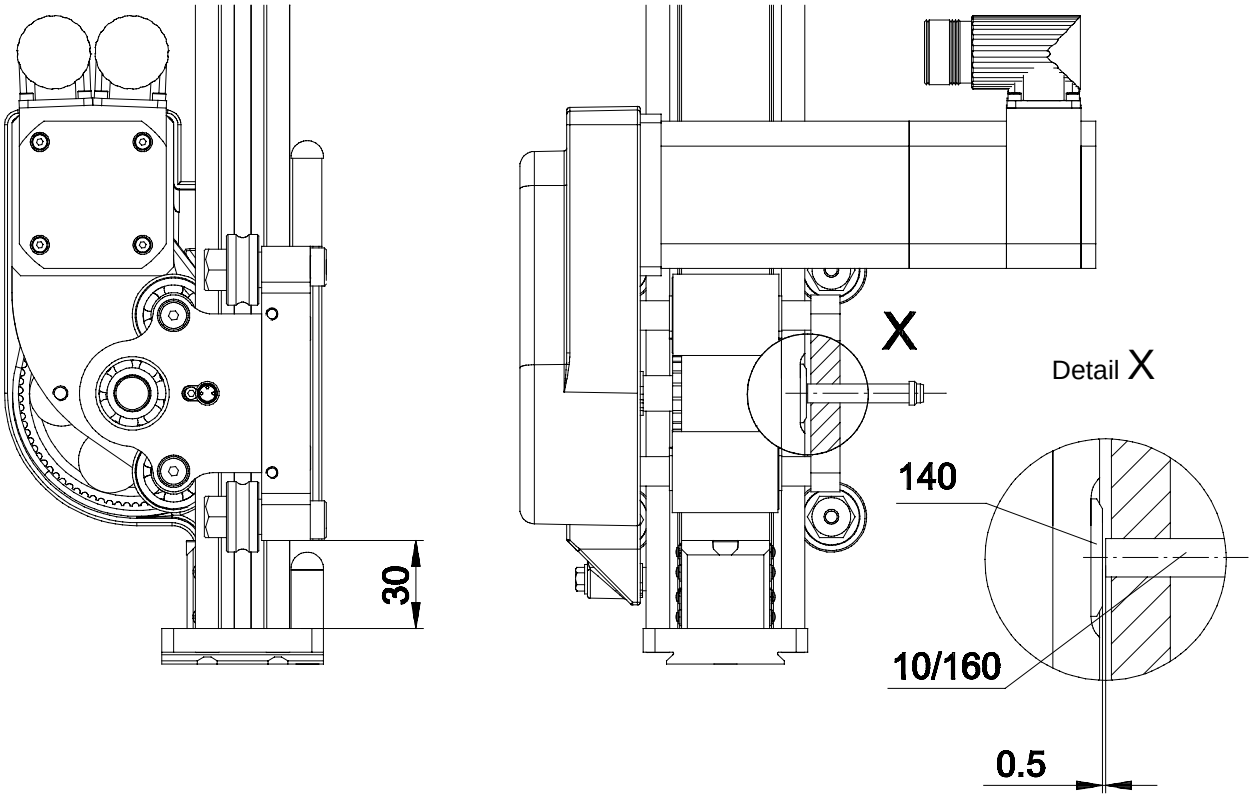


Fig. 16



- Move lifting arm to position indicated (dimension 30 mm).
- Set proximity switch (10/160) according to detail X. The distance between the proximity switch (10/160) and the damping plate (140) must be 0.5 mm.
- Slightly tighten screw (10/140; Fig.15).
- Mount covers (110). Caution! The two lubricating felts in the cover must touch the shaft.
- Mount plug (200; Fig.15).
- The LED of the proximity switch must light up when supply voltage is applied.
- If this is not the case, the reference traverse can be carried out.

Changing the tool belt / Changing shafts and rollers

Procedure:

- Carry out a reference traverse.
- Switch off the supply voltage.
- Secure the lifting arm position mechanically.

- **The servo amplifier must be disconnected from the supply voltage. Switch off the main switch or mains contactor.**
- **Ensure that no unauthorized switching-on of the supply voltage can occur.**
- **During operation, the surface of the motor can reach 100°C. Do not touch the motor until the temperature has dropped below 40°C (measure the surface temperature).**
- **Failure to observe these safety measures may result in death or severe personal injuries or material damage.**

Procedure after switching off the supply voltage:

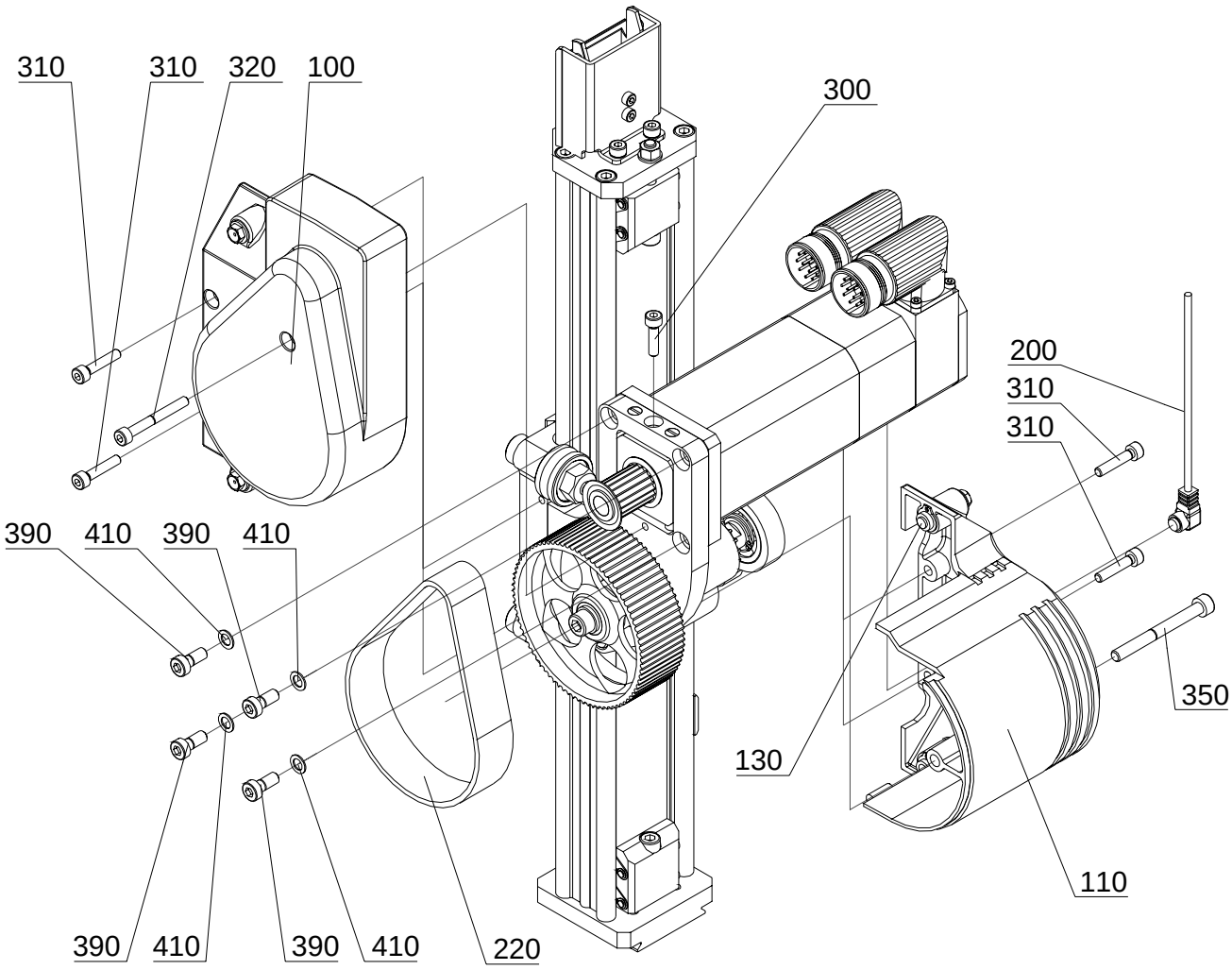
- Remove toothed belt (220) Page C18
- Remove toothed belt (210) Page C19
- Replace rollers and shafts Page C20
- Mount toothed belt (210) Page C22
- Mount toothed belt (220) Page C24

Tool required	Dimension	Use for:
Hexagon socket wrench	3 mm	Item 290; 300; 310; 320
	4 mm	Item 350; 360; 370; 380; 390; 10/100
Spanner	8 mm	Item 440
	14 mm	Item 10/110; 10/120
Adhesive tape		Item 210

Removing toothed belt (220)

Tool required	Dimension	Use for:
Hexagon socket wrench	3 mm	Item 300; 310; 320
	4 mm	Item 350; 390

Fig. 17



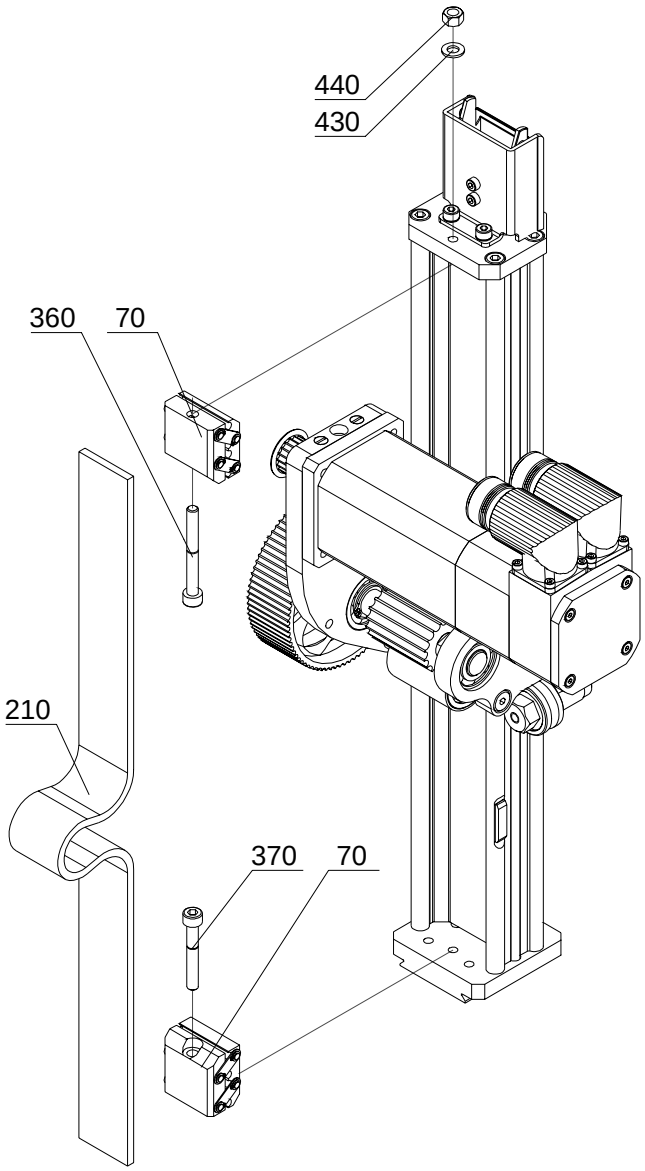
Procedure:

- Remove covers (100, 110). Caution! Ensure that the four felt wicks (130) in the cover (100, 110) of the lubrication unit do not fall out.
- Slacken machine screws (390) and remove.
- Slacken machine screw (300) and push servo motor to rear end position.
- Remove toothed belt (220).

Removing toothed belt (210)

Tool required	Dimension	Use for:
Hexagon socket wrench	4 mm	Item 360; 370
Spanner	8 mm	Item 440
Adhesive tape		Item 210

Fig. 18



Procedure:

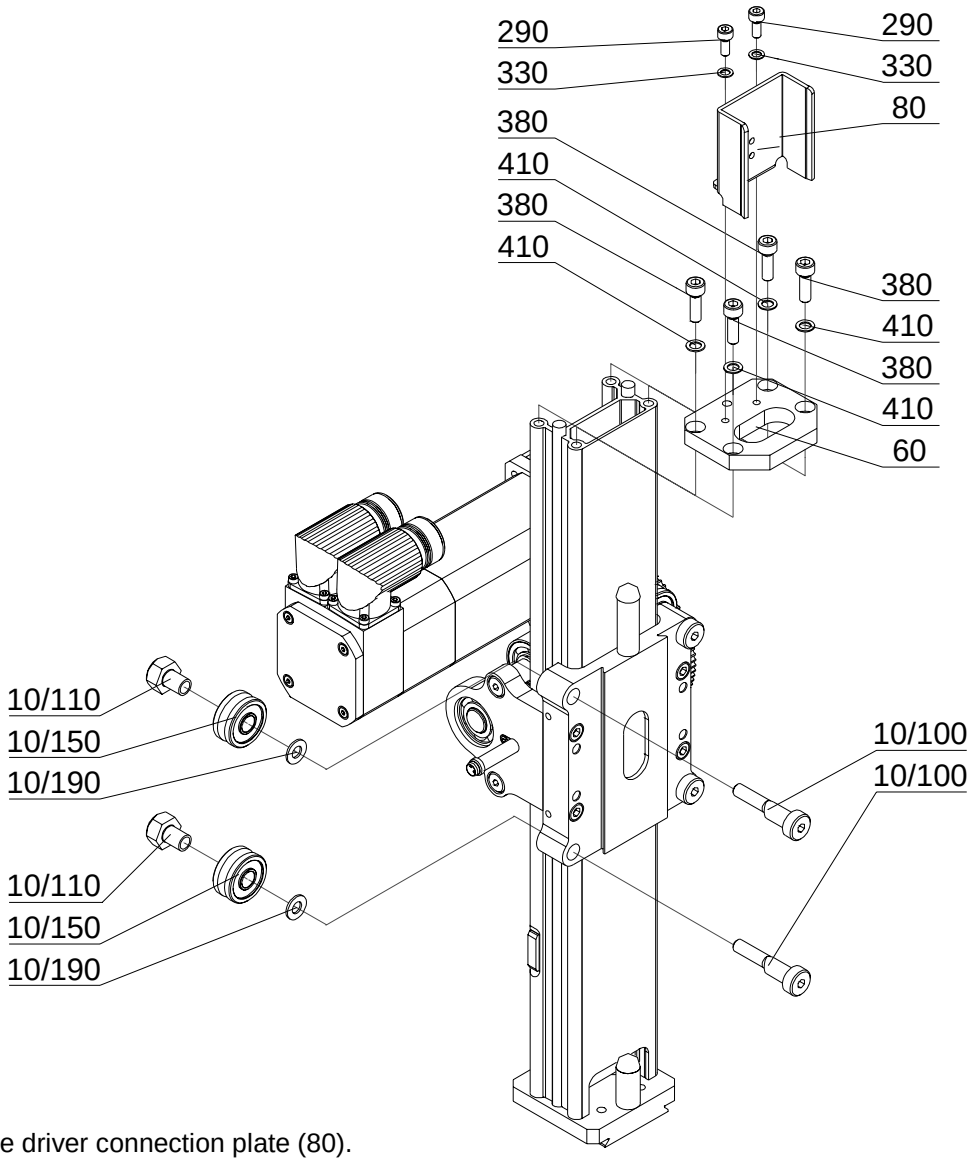
- Slacken hexagon nut (440) and washer (430) and remove.
- Slacken machine screws (360 and 370) and remove.
- Open toothed belt fastening (70) and remove from the toothed belt (210).
- Attach the old toothed belt (210) at the end to the new toothed belt using adhesive tape.
- Carefully draw in the new toothed belt (210).
- After drawing in the new toothed belt, remove the old one and dispose of.
- Open toothed belt fastening at top and bottom (70) and introduce toothed belt (210).
- Mount lower toothed belt fastening (70) with machine screw (370) and tighten.

Changing shafts and rollers

Always change the shafts (30, Fig. 20) together with the associated rollers (10/150, Fig.19 and 20).

Tool required	Dimension	Use for:
Hexagon socket wrench	3 mm	Item 290
	4 mm	Item 380; 10/100
Spanner	14 mm	Item 10/110; 10/120

Fig. 19

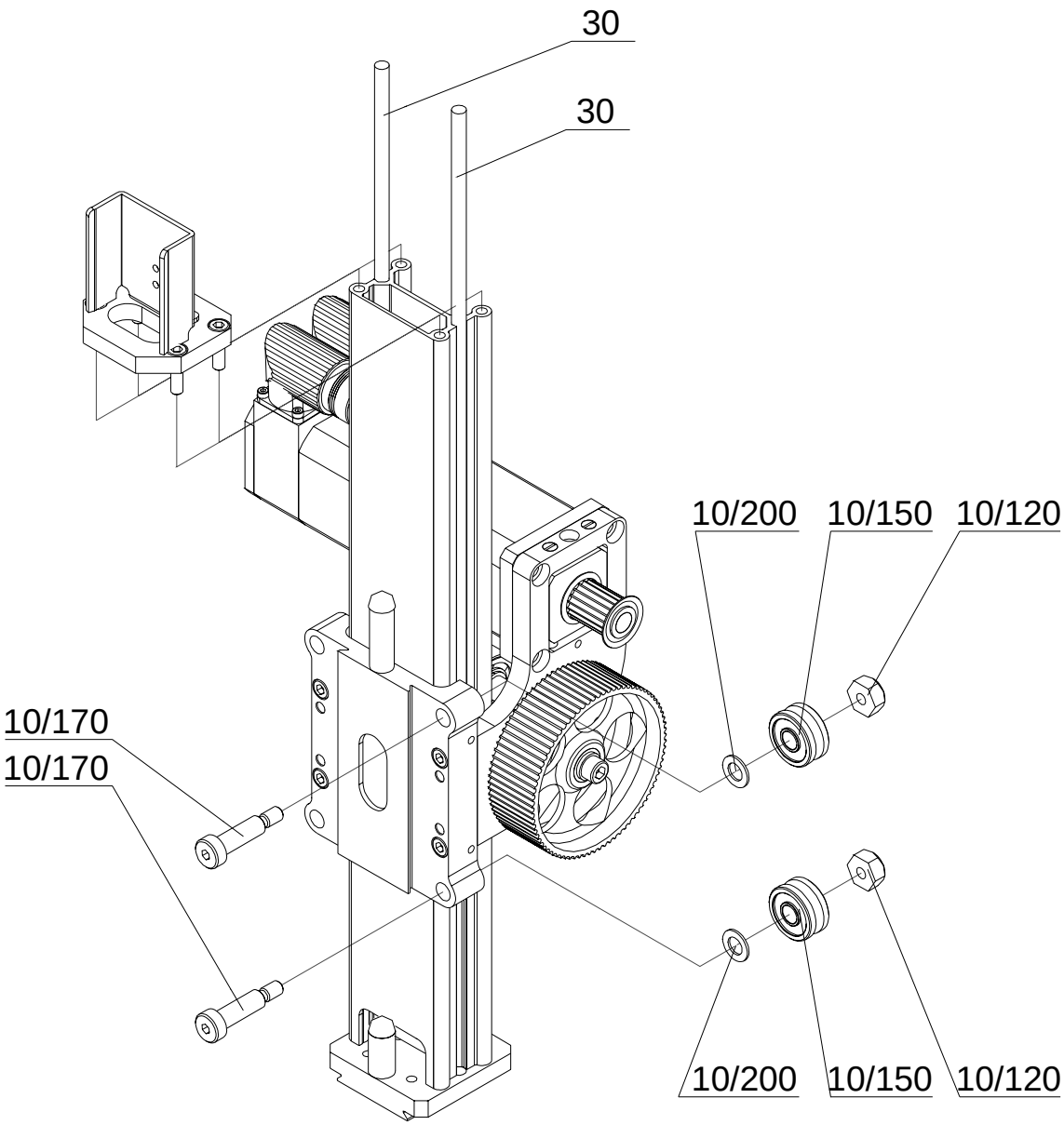


Procedure:

- Remove driver connection plate (80).
- Remove end plate (60).
- Slacken nut (10/110). Hold eccentric screw (10/100) with socket screw wrench.
- Remove eccentric screw (10/100), shim (10/190), nut for cam (10/110) and roller (10/150).
- Push new roller (10/150) onto nut (10/110).
- Assemble in reverse order but without tightening the nut (10/110). It must be possible to turn the eccentric screw (10/100).

- Pull shafts (30) out of the guide and insert new shafts. The shafts must be inserted into the holes in the adapter plate (40).
- Slacken nut (10/120). Hold tight-fit shoulder screw (10/170) with socket screw wrench.
- Remove tight-shoulder screw (10/170), shim (10/200), nut for concentric shaft (10/120) and roller (10/150).
- Assemble in reverse order with new rollers (10/150).
- Tighten nut (10/120) by holding the tight-fit shoulder screw (10/170) with the socket screw wrench.
- Adjust the rollers to eliminate play by turning the eccentric screw (10/100; Fig. 19) clockwise (without pretension).
- Tighten nut (10/110; Fig. 19) while holding the eccentric screw (10/100; Fig.19) with the socket screw wrench so that the slide play set does not change.
- Mount driver connection plate (80; Fig. 19).
- Mount end plate (60; Fig.19).

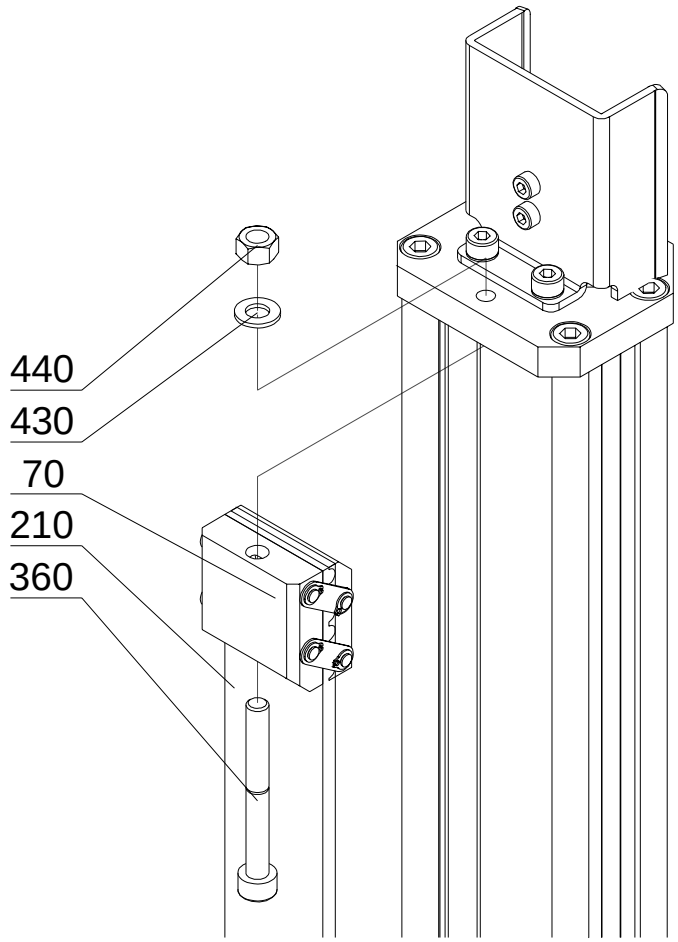
Fig. 20



Mounting toothed belt (210)

Tool required	Dimension	Use for:
Hexagon socket wrench	4 mm	Item 360
Spanner	8 mm	Item 440

Fig. 21



Procedure:

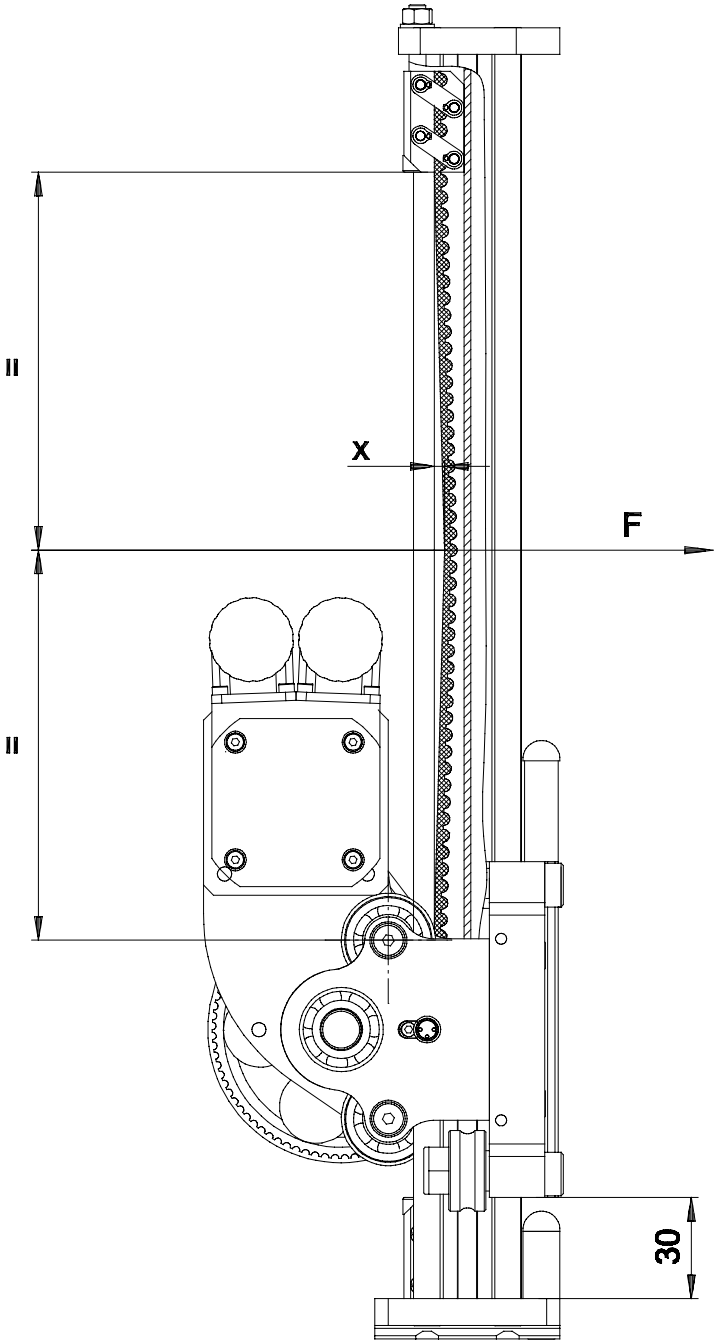
- Mount upper toothed belt fastening (70) with machine screw (360) and generate toothed belt pretension. → Toothed belt pretension according to following chapter, page C23.
- Mount lock nut (440) and washer (430) and tighten.

Toothed belt pretension of 210

The pretensions shown in the Table are maximum values and relate to a vertical axis without load. If additional units are installed, the toothed belt should be relieved by suitable aids.
If the toothed belt is **loaded** with a **higher pretension**, this results in **premature wear** of the toothed belt and an **increase in the noise level**.

Type	Pretension [N]	Deflection force F [N]	Deflection x [mm]
SVA-130-200	280	19.4	3
SVA-130-400	280	8.7	3
SVA-130-600	280	5.7	3

Fig. 22



Mounting toothed belt (220) and setting the zero point

Procedure:

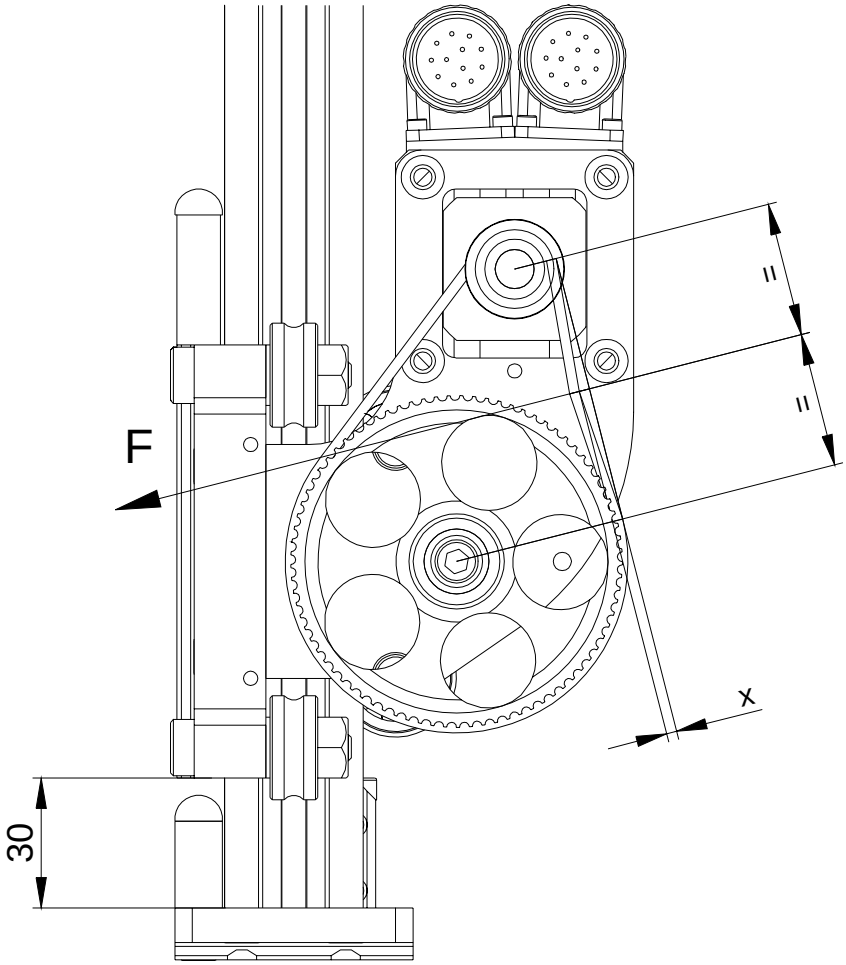
- Lifting arm position according to Fig. 23
- Mount toothed belt (220; Fig. 24).
- Generate toothed belt pretension by means of machine screw (300; Fig. 24).

Toothed belt pretension of 220

The pretensions shown in the Table are maximum values.
If the toothed belt is **loaded** with a **higher pretension**, this results in **premature wear** of the toothed belt and an **increase in the noise level**.

Type	Deflection force F [N]	Deflection x [mm]
SVA-130	6.7	1.2

Fig. 23



Further procedure:

- Fasten servo motor with machine screws (390) and ribbed washers (410).
- Mount covers (100 and 110). Caution! The four lubricating felts (130) must touch the shaft.
- Check the target positions according to the operator software manual «Commissioning after maintenance work».

Fig. 24

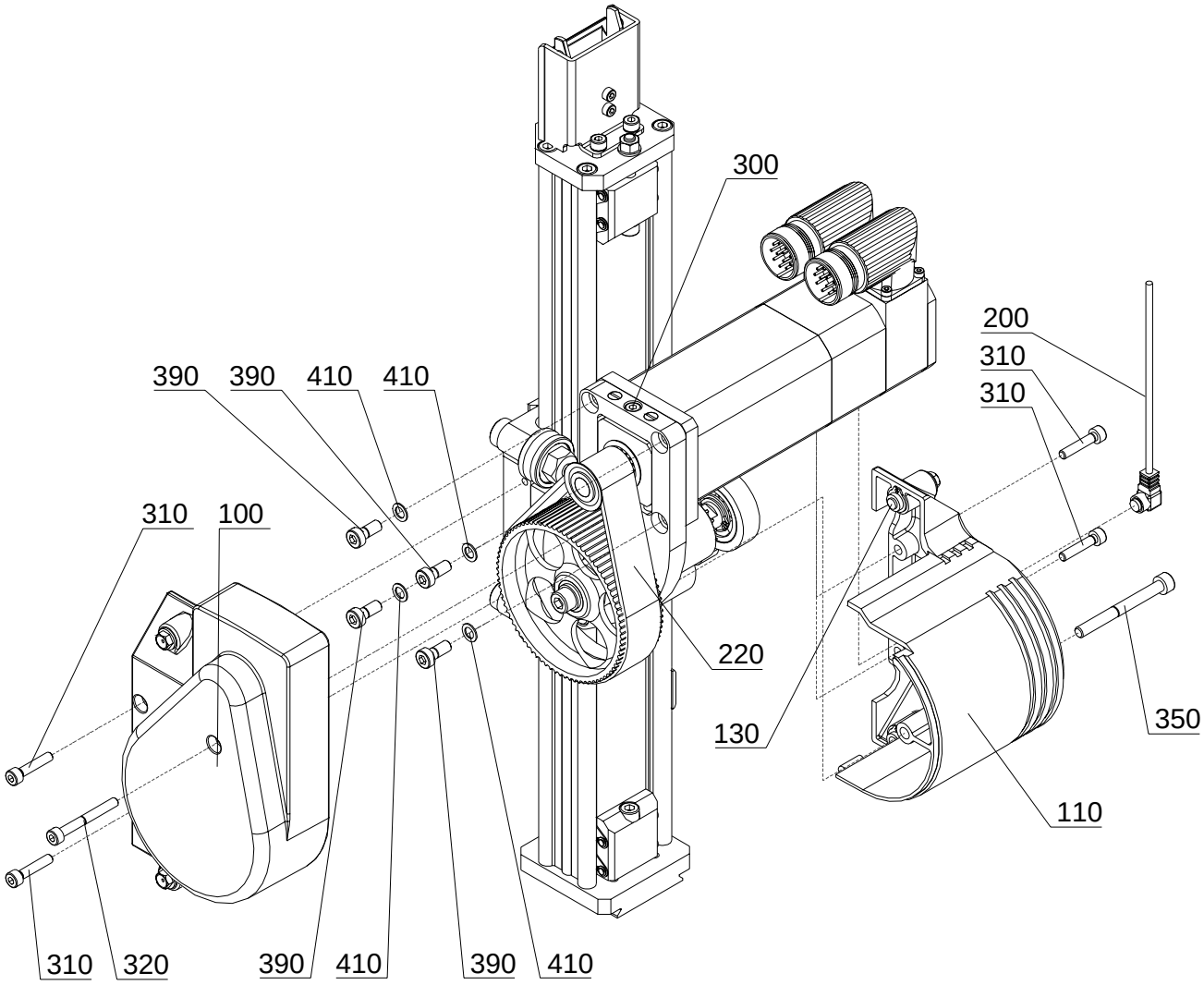
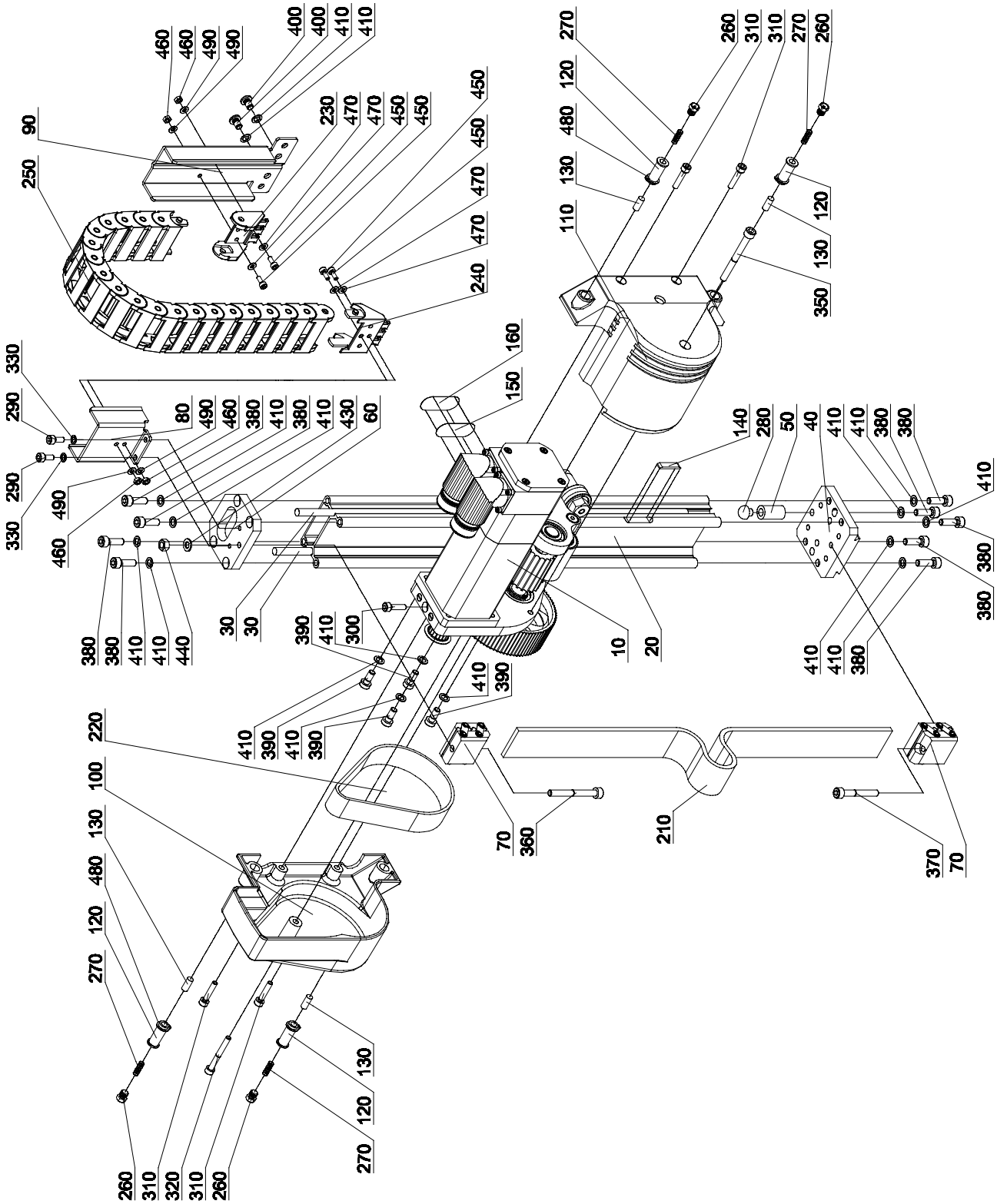


Fig. 25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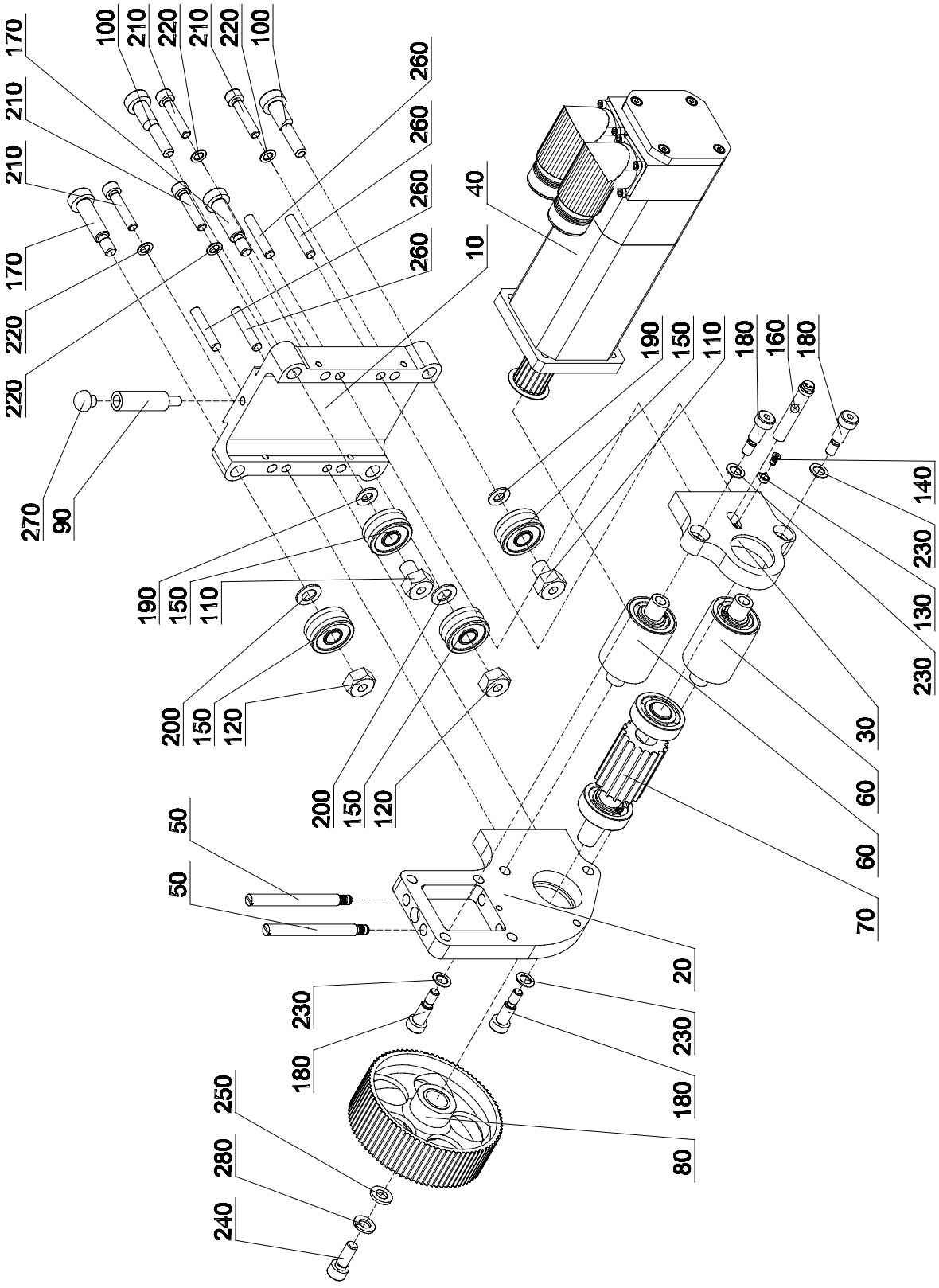
Servo vertical axis SVA-130

Item	Designation	Article number				Supplier	Material
	SVA-130-	-200	-400	-600	Stroke-independent		
	Basic unit	49436	49437	49438		Montech AG	Various
10	Drive, assembled				48743	Montech AG	Various
20	Lifting arm profile	48827	48828	48829		Montech AG	Aluminium
30	Shaft	48820	48821	48822		Montech AG	Steel
40	Adapter plate				48674	Montech AG	Aluminium
50	Stop, bottom				48742	Montech AG	Aluminium
60	End plate				48675	Montech AG	Aluminium
70	Clamping device, assembled				48681	Montech AG	Various
80	Driver connection plate				48740	Montech AG	Aluminium
90	Fixed-point connection plate				49046	Montech AG	Aluminium
100	Cover, left				48778	Montech AG	PUR
110	Cover, right				48779	Montech AG	PUR
120	Tube for lubrication				48813	Montech AG	Aluminium
130	Wick				40921	Montech AG	Wool felt
140	Damping plate				46804	Montech AG	Steel
150	Type plate CE				41620	Montech AG	Metallized polyester
160	Badge for type plate				48508	Montech AG	
210	Toothed belt				506634	Rud. Uiker AG	Glass fibre/PUR
220	Toothed belt transmission				506632	Rud. Uiker AG	Glass fibre/PUR
230	Driver connection 0180.30 MA				506478	Kabelschlepp	PA
240	Fixed connection 0180.30 FA				506647	Kabelschlepp	PA
250	Chain link 0180.30.50				506477	Kabelschlepp	PA
260	Lubricating nipple				504554	Hausamann AG	Brass
270	Pressure spring				504119	Kubo Tech AG	Steel
280	Plug-in stop 101714				506160	Maag Technik AG	NR
290	Hex. socket machine screw ISO 4762-M4x10-8.8						Blackened steel
300	Hex. socket machine screw ISO 4762-M4x16-8.8						Blackened steel
310	Hex. socket machine screw ISO 4762-M4x20-8.8						Blackened steel
320	Hex. socket machine screw ISO 4762-M4x35-8.8						Blackened steel
330	Ribbed washer BN 791-ø4.3/ø7x0.5				502364	Bossard AG	Blackened steel
350	Hex. socket machine screw ISO 4762-M5x90-A4						Stahl inox
360	Hex. socket machine screw ISO 4762-M5x45-8.8						Blackened steel
370	Hex. socket machine screw ISO 4762-M5x35-8.8						Blackened steel
380	Hex. socket machine screw ISO 4762-M5x16-8.8						Blackened steel
390	Hex. socket machine screw DIN 6912-M5x12-8.8						Blackened steel
400	Machine screw BN 1206-M5x8-10.9				506668	Bossard AG	Blackened steel
410	Ribbed washer BN 791-ø5.3/ø8.5x0.6-				502365	Bossard AG	Blackened steel
430	Bevelled washer ISO 7090-ø5.3/ø10x1						Blackened steel
440	Hexagon nut ISO 4032-M5x0.8d-Kl.8						Blackened steel
450	Hex. socket machine screw ISO 4762-M3x8-8.8						Blackened steel
460	Hexagon nut ISO 4032-M3x0.8d-Kl.8						Blackened steel
470	Washer without bevel ISO 7089-ø3.2/ø7x0.5						Blackened steel
480	Circlip for shaft DIN 471-8x0.8						Blackened steel
410	Ribbed washer BN 791-ø3.2/ø5.5x0.45-				502363	Bossard AG	Blackened steel

Fig. 26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Drive, assembled

Item	Designation	Art. No.	Supplier	Material
10	Drive, assembled	48743		
10/10	Adapter plate	48787	Montech AG	Aluminium
10/20	Bearing plate, left	48777	Montech AG	Aluminium
10/30	Bearing plate, right	48776	Montech AG	Aluminium
10/40	Servo motor, assembled	48791	Montech AG	Various
10/50	Guide rod	47862	Montech AG	Steel
10/60	Deflection shaft	48796	Montech AG	Steel
10/70	Gear shaft	48779	Montech AG	Steel/Aluminium
10/80	Crown gear	48793	Montech AG	Steel/Aluminium
10/90	Stop, top	48816	Montech AG	Aluminium
10/100	Eccentric screw	48738	Montech AG	Steel
10/110	Nut for eccentric shaft	48737	Montech AG	Steel
10/120	Nut for concentric shaft	48739	Montech AG	Steel
10/130	Clamping piece	47906	Montech AG	Steel
10/140	Clamping screw	47904	Montech AG	Steel
10/150	Roller	503663	INA	Steel
10/160	Proximity switch	504609	Baumer	Various
10/170	Hex. socket tight-fit shoulder screw ISO 7379-ø8x25/M6-12.9			Steel
10/180	Hex. socket tight-fit shoulder screw ISO 7379-ø6x12/M5-12.9			Steel
10/190	Shim DIN 988-ø6/12x1			Steel
10/200	Shim DIN 988-ø8/14x1			Steel
10/210	Hex. socket machine screw ISO 4762-M5x25-8.8			Blackened steel
10/220	Ribbed washer BN 791-ø5.3/ø8.5x0.6-10.9	502365	Bossard AG	Blackened steel
10/230	Ribbed washer BN 791-ø6.4/ø10x0.7-10.9	502366	Bossard AG	Blackened steel
10/240	Hex. socket machine screw ISO 4762-M6x16-8.8			Steel
10/250	Washer ISO 7093-ø6.4/ø18x1.6			Steel
10/260	Straight pin, hardened and ground, ISO 8734 ø5h6x28			Steel
10/270	Plug-in stop	506160	Maag Technik AG	NR
10/280	Spring washer DIN 127B-ø6.1/ø11.8/1.6			Blackened steel

Environmental compatibility and disposal

Materials used

- Aluminium
- Steel
- Brass
- Wool fibres
- PUR Polyurethane
- PA Polyamide
- NR Natural rubber

Surface treatment

- Anodic oxidation of aluminium
- Blackening of steel

Shaping processes

- Profile extrusion of aluminium
- Machining of metals and plastics
- Vacuum-casting of plastics

Emissions during operation

- None

Disposal

Servo vertical axes (SVA-130) or handling units retrofitted to portal loaders that are no longer in use are to be dismantled into individual parts and recycled according to the type of material. The type of material for each part is stated in the spare parts lists. Any non-recyclable material is to be disposed of properly according to materials, taking into account the regulations which apply in your location.